# Full Statistical Mediation of the Relationship between Trauma and Depressive Symptoms

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**Abstract**

Due to the potentially devastating effects of trauma-induced depression, explaining the relationship between trauma and depressive symptoms is important. In this study we measured lifelong exposure to potentially traumatic events and depressive symptoms in 370 female undergraduates. We also measured anxiety, past negative time perspective, and dissociation as potential mediators. Trauma exposure and depressive symptoms were related with a small but significant effect size ($r$ = .16). Trauma was not associated with dissociation. We found that past negative time perspective and anxiety were full statistical mediators of this trauma-depressive symptoms relationship. These two mediators combined accounted for all of the variance in that association. Anxiety accounted for more of the variance than past negative time perspective. A proposed explanation is that trauma both affectively elevates anxiety and cognitively creates an enduring focus on the events. Chronic anxiety and a past negative time perspective may lead to depression over time. The clinical implications are possible explanations as to why some treatments work.

*Keywords.* Depressive Symptoms, Trauma, Past Negative Time Perspective, Anxiety, Dissociation

## Full Statistical Mediation of the Relationship between Trauma and Depressive Symptoms

Depression is a common but serious condition that can affect many aspects of an individual's life. The personal costs to individuals who suffer from depression can be large. These personal costs range from impaired working memory, as found in a cross-sectional study by Rose and Ebmeier (2006) to impaired well-being, as found in a longitudinal study by Beekman, Deeg, Braam, Smit, and Tilburg (1997). A systematic review by Hawton, Comabella, Haw, and Sanders (2013) suggested that increased risk for suicide is a personal cost to those who suffer from depression. Past literature review research has suggested that depression may be the most common disorder following trauma (Laugharne, Lillee, & Janca, 2010), and a longitudinal study revealed that history of trauma is a risk factor for chronic depression (Zlotnick, Warshaw, Shea, & Keller, 1997). Given the serious distress depression can cause individuals, and the hypothesized relationship between exposure to traumatic events and subsequent depression, it is important to explore factors that might help explain the relationship between trauma and depression. In this study, we investigate mediating factors of the relationship between exposure to potentially traumatic events and depressive symptoms.

Some research studies have suggested traumatic experiences are associated with subsequent depression. This relationship has been shown to occur in a longitudinal study, regardless of gender, and after adjusting for confounding variables such as family history of depression and years of education (Tanskanen et al., 2004). There is also support for this relationship from cross-sectional studies as well, such as Wiersma and colleagues who found childhood abuse and neglect have been associated with adult depression chronicity even after controlling for comorbid anxiety, age of onset of depression, and severity of depressive symptoms (Wiersma et al., 2009). Nevertheless, there are currently few studies that have

investigated possible mediating factors for the relationship between trauma and depressive symptoms.

**Possible Mediators of Trauma and Depressive Symptoms**

**Anxiety.** Previous research in a cross-sectional study found that traumatized subjects had higher levels of anxiety and PTSD, and symptoms were more intense in individuals who had experienced multiple traumas (Vrana & Lauterbach, 1994). The temporal development of anxiety before depression has been found in several research studies. In a clinical population of adults, Lesse (1982) presented data that led him to propose a pathway whereby stress, including trauma, leads to anxiety, which then leads to depression. Lesse observed a pattern in 60 patients where anxiety sometimes "appeared immediately following the trauma" and "it was usually only after weeks or months of mounting anxiety … that evidences of a developing depressive core could be documented" (p. 347). Consistent with Lesse's suggestion of temporal order, a longitudinal study of war veterans found that PTSD, a disorder involving some anxiety, predicted later depression, but not vice versa (Ginzburg, Ein-Dor, & Solomon, 2010). The theoretical pathway from trauma to an anxiety-laden stress response to subsequent depression is why we investigate anxiety as a possible mediator in the present study.

**Past Negative Time Perspective.** Trauma can lead to a cognitive and psychological disruption where individuals feel trapped in the traumatic event, and it exerts a pervasive influence over their feelings, thoughts, and behaviors (Silver, Boon, & Stones, 1983). Previous research suggests individuals who have experienced trauma and focus on their past may experience distress associated with the traumatic event. Based upon this research, Holman and Silver (1998) suggested that trauma can affect an individual's temporal orientation. Moreover, Holman and Silver found that temporal orientation was significantly associated with

psychological distress scores. Specifically, individuals who remained focused on the past reported significantly higher levels of psychological distress than those individuals who were either present- or future-oriented. Most importantly, they found that a past-oriented temporal orientation *mediated* the relationship between the immediate effects of trauma (temporal disintegration) and subsequent emotional distress at a later time period. Higher past negative scores on the Zimbardo Time Perspective Inventory (ZTPI; Zimbardo & Boyd, 1999) have been associated with higher levels of depression and suicidal ideation in psychiatric and healthy individuals (van Beek, Berghuis, Kerkhof, & Beekman, 2010). This relationship holds for younger (Zimbardo & Boyd, 1999) and older (Desmyter & de Raedt, 2012) adults. Thus time perspective is considered as a mechanism between exposure to trauma and depressive symptoms.

**Dissociation.** There have been numerous studies on the relationship between trauma, dissociation, and depression. Some researchers have suggested dissociation is a mental defense that develops after an individual experiences an event he or she perceives as traumatic (e.g., Dalenberg et al., 2012). In other words, they argue that trauma may lead to the development of dissociation. However, others have argued that individuals who are prone to dissociation are more likely to also be prone to cognitive distortions and fantasies, thus leading to inaccurate perceptions and increased trauma reporting (Rassin & van Rootslaar, 2006). They suggest dissociation may lead to increased likelihood of perceiving events as traumatic. There is limited research on how dissociation affects depression, but Bob, Susta, Pavlat, Hynek, and Raboch (2005) found dissociative processes was associated with depressive cognition. Therefore, we investigate whether dissociation is a factor that mediates the relationship between exposure to trauma and depressive symptoms.

## The Present Study

Despite these studies, there are still gaps in the literature regarding possible mediators of the relationship between trauma and depressive symptoms. In this study we seek to identify plausible mediating factors that may explain the relationship between trauma and depressive symptoms. Although Holman and Silver (1998) suggested temporal orientation may be important in a similar relationship, their outcome measure was not specifically depressive symptoms, nor did their mediation model investigate anxiety and dissociation. Here, we examine three possible mediators: anxiety, past negative time perspective, and dissociation to gain insight as to how much they comparatively reveal the relationship between trauma and depressive symptoms. Determining the mediators of the relationship between trauma and depressive symptoms may provide valuable information of theoretical mechanisms involved as well as insight toward treatment and therapeutic interventions.

## Method

### Participants

Three hundred ninety-eight female undergraduates voluntarily participated as one of the options for extra credit in their eligible courses. Data from 28 students were excluded before data analysis began after failing one or both attention-check questions, or due to 16+ repetitive responses. Therefore our analysis included data from 370 students (age range 18–59, $M = 20.52$ years, $SD = 2.93$; 48.6% Asian, 24.3% Hispanic, 23.2% White, 3.8% other ethnicities). Self-reported family socio-economic status (SES) was $M = 5.48$ ($SD = 1.68$) on a Likert scale of 1 = *lowest* to 10 = *highest* relative to other families in the U.S. All participants gave informed consent, and the study was approved by the Institutional Review Board at the University of California, Irvine.

### Materials

**Time perspective.** The Zimbardo Time Perspective Inventory (Zimbardo & Boyd, 1999) is the first multi-dimensional time perspective survey. It is designed to assess a person's attitudes and orientations to five time perspectives: Past Negative, Past Positive, Present Hedonistic, Present Fatalistic, and Future. The 56-item survey asks subjects to indicate how closely they align with a characteristic statement, such as "Painful past experiences keep being replayed in my mind" or "I think about the good things that I have missed out on in my life". Responses are on a 5-point Likert scale, ranging from 1 (*very untrue*) to 5 (*very true*), with five of the 56 items reverse coded. Each time perspective subscale has a unique number of designated characteristic statements, and all values of every answer within each category are summed and divided by the number of questions. The present study focuses on the Past Negative subscale scores.

**Potentially traumatic events.** The Life Events Checklist (LEC) originates from the first section of the Clinician-Administered PTSD Scale (CAPS; Blake et al., 1995; see also Gray, Litz, Hsu, & Lombardo, 2004). The LEC measures exposure to stressful or potentially traumatic events (e.g., sexual assault, natural disaster, life-threatening illness or injury) over a person's lifetime. Answers to the 17 questions are rated on a 5-item multiple choice: *happened to you personally*; *you witnessed it happen to someone else; you learned about it happening to someone close to you; you're not sure if it fits*; or *it doesn't apply to you*. In the present study we only counted responses of 'happened to you personally' as exposure to a potentially traumatic event (coded "yes" = 1, "no" = 0). The "yes" answers were summed to obtain an overall score for analysis. Gray et al. (2004) noted that inter-item correlation between trauma types within the scale would not be meaningful measure of reliability, but found that the LEC had good test-retest reliability and was significantly associated with the PTSD Checklist–Military Version (PCL-M), the Mississippi Scale for Combat-Related PTSD (MPSS), and the CAPS.

**Depression.** The Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) was designed to categorize general depressive indicators observed through clinical observations into 21 symptoms and attitudes. Participants are asked to self-score the inventory with a range of possibilities from 0 (*no symptom*) to 3 (*frequently has symptom*) related to how they "feel today, that is, ***right at this moment***" (our emphasis). Symptoms and attitudes measured include: crying, work inhibition, fatigability, suicidal wishes, guilt, etc. The cumulative BDI score is categorized as: < 10 indicates no or minimal depression; scores from 10–18 indicate mild to moderate depression; scores from 19–29 indicate moderate to severe depression; and scores from 30–63 indicate severe depression. Henceforth in this article we use the word "depression" to refer to this continuous score on the BDI, not to be confused with a discontinuous categorical use of the word.

**Anxiety.** The Self-Report Anxiety Scale (SAS; Zung, 1971) is a 20-item survey designed to measure self-reported anxiety "during the past several days." This self-report questionnaire is designed to assess the participant's responses to 20 anxiety-related statements such as: "I feel more nervous and anxious than usual," and "I feel like I'm falling apart and going to pieces." Fifteen negatively worded statements are scored on a 4 point Likert scale ranging from *a little bit of the time* (scored 1) to *most of the time* (scored 4). Five positively-worded statements are reverse coded on a 4 point Likert scale ranging from *a little bit of the time* (scored 4) to *most of the time* (scored 1). The cumulative SAS score is categorized as: 20–35 is the normal anxious range, 36–47 is mild to moderate anxiety, 48–59 is marked to severely anxious, and 60 and up is extremely anxious (Zung, 1971).

**Dissociation.** The Dissociative Experiences Scale-Comparison (DES-C; Wright & Loftus, 1999) is a self-report 28-item questionnaire that was designed to measure how a person's

dissociative symptoms such as “some people have the experience of driving or riding in a car or bus or subway and suddenly realizing that they don’t remember what has happened during all or part of the trip” and “some people have the experience of finding themselves in a place and having no idea how they got there” compared with other people. The DES-C has an 11-point Likert scale that measures how subjects compare themselves to others, with anchors: *Much less than others* (lower anchor scored as 1), *About the same as others* (midpoint scored as 6), and *Much more than others* (upper anchor scored as 11). The responses were summed to obtain an overall score for analysis.

The following demographic information was collected: gender, age, SES, ethnicity, and religious affiliation. A task involving recall memory for words in a previously presented list was also completed (a directed forgetting task) but this is not included in the present study.

**Procedure**

Participants were informed they were participating in an online study about personality and experiences in life. Participants were instructed to find a quiet place, away from distractions before beginning the study. The amount of time taken to complete the study was approximately 35 minutes. Measures were presented to participants in the following order: dissociation, time perspective, depression, anxiety, exposure to potential trauma, and demographics. Exposure to potentially traumatic events was measured after the other variables to avoid the possibility that trauma recollection might influence answers on the other scales.

**Statistical Analyses**

To test the proposed mediation model, Hayes' PROCESS macro for SPSS was used. PROCESS is an SPSS add-on tool designed to aid in statistical mediation analyses and can be used for non-categorical variables to estimate statistics such as unstandardized model

coefficients, standard errors, p-values, and confidence intervals using either Ordinary Least Squares (OLS) regression (for continuous outcomes) or maximum likelihood logistic regression (for dichotomous outcomes) as well as generate direct and indirect effects in mediation models with a single or multiple mediators. PROCESS uses the bootstrapping method, where the sampling distribution of the conditional indirect effect is not assumed to be normal, to test estimated indirect effects (Hayes, 2012; Hayes, 2013). Analyses were run using PROCESS's mediation model 4 (for single or parallel mediators). The estimate of each indirect effect was quantified as the product of two OLS regression coefficients: one estimating the mediator variable from trauma and the second estimating depressive symptoms from the mediator variable while controlling for trauma. A bias-corrected 95% bootstrap CI for the product of these paths suggested a mediation effect for two of the three mediator variables.

**Results**

The percentages of participants who indicated exposure to various traumas (Table 1), a zero-order correlation table of the main variables (Table 2), the Cronbach's alpha coefficients for the relevant multi-item measures used in our study (Table 3), and the distribution of depression levels by BDI categories (Table 4) were calculated.

Table 1.
*Percentages of Participants Indicating Various Potential Traumas on the Life Events Checklist*

| | Happened to Me | | Not Indicated | | Total | Cumulative |
|---|---|---|---|---|---|---|
| | *n* | % | *n* | % | *n* | % |
| Natural disaster (for example, flood, hurricane, tornado, earthquake) | 156 | 42.2 | 214 | 57.8 | 370 | 100 |
| Fire or explosion | 29 | 7.8 | 341 | 92.2 | 370 | 100 |
| Transportation accident (for example, car accident, boat accident, train wreck, plane crash) | 185 | 50 | 185 | 50 | 370 | 100 |
| Serious accident at work, home, or during recreational activity | 50 | 13.5 | 320 | 86.5 | 370 | 100 |
| Exposure to toxic substance (for example, dangerous chemicals, radiation) | 5 | 1.4 | 365 | 98.6 | 370 | 100 |
| Physical assault (for example, being attacked, hit, slapped, kicked, beaten up) | 64 | 17.3 | 306 | 82.7 | 370 | 100 |
| Assault with a weapon (for example, being shot, stabbed, threatened with a knife, gun, bomb) | 13 | 3.5 | 357 | 96.5 | 370 | 100 |
| Sexual assault (rape, attempted rape, made to perform any type of sexual act through force or threat) | 36 | 9.7 | 334 | 90.3 | 370 | 100 |
| Other unwanted or uncomfortable sexual experience | 91 | 24.6 | 279 | 75.4 | 370 | 100 |
| Combat exposure to war-zone (in the military or as a civilian) | 3 | 0.8 | 367 | 99.2 | 370 | 100 |

(continues)

Table 1. (continued)

*Percentages of Participants Indicating Various Potential Traumas on the Life Events Checklist*

| | Happened to Me | | Not Indicated | | Total | Cumulative |
|---|---|---|---|---|---|---|
| | *n* | % | *n* | % | *n* | % |
| Captivity (for example, being kidnapped, abducted, held hostage, prisoner of war) | 3 | 0.8 | 367 | 99.2 | 370 | 100 |
| Life-threatening illness or injury | 21 | 5.7 | 349 | 94.3 | 370 | 100 |
| Severe human suffering | 7 | 1.9 | 363 | 98.1 | 370 | 100 |
| Sudden, violent death (for example, homicide, suicide) | 2 | 0.5 | 368 | 99.5 | 370 | 100 |
| Sudden, unexpected death of someone close to you | 107 | 28.9 | 263 | 71.1 | 370 | 100 |
| Serious injury, harm, or death you caused to someone else | 8 | 2.2 | 362 | 97.8 | 370 | 100 |
| Any other very stressful event or experience | 77 | 20.8 | 293 | 79.2 | 370 | 100 |

Table 2.

*Zero-order Pearson* r *Correlations between Main Variables*

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| (1) Trauma | 1.00 | .22** | .24** | .10 | .16** |
| (2) Anxiety | | 1.00 | .49** | .37** | .73** |
| (3) Past Negative | | | 1.00 | .37** | .53** |
| (4) Dissociation | | | | 1.00 | .35** |
| (5) Depression | | | | | 1.00 |

*Note.* $^{**}p < 0.01$ level. Trauma = LEC score. Anxiety = SAS score. Past Negative = ZPTI Subscale score. Dissociation = DES-C score. Depression = BDI continuous score. $N = 370$.

Table 3.
*Scale Means, Standard Deviations, and Cronbach's Alphas for Depression, Anxiety, Dissociation, and Time Perspective (N = 370).*

| Measure | *M* | *SD* | α | Number of items |
|---|---|---|---|---|
| Dissociation | 110.03 | 41.57 | .94 | 28 |
| Time Perspective | | | | |
| Past Negative | 31.99 | 6.45 | .81 | 10 |
| Present Hedonistic | 50.19 | 7.39 | .82 | 15 |
| Future | 47.83 | 6.17 | .76 | 13 |
| Past Positive | 32.74 | 4.73 | .74 | 9 |
| Present Fatalistic | 23.13 | 5.06 | .75 | 9 |
| Anxiety | 35.47 | 7.98 | .84 | 20 |
| Depression | 9.15 | 7.93 | .90 | 21 |

*Note*. Time Perspective = Zimbardo's Time Perspective Inventory; Anxiety = Zung's Self-Report Anxiety Scale; Depression = Beck Depression Inventory.

Table 4.
*Participants' Levels of Depression as Measured on BDI*

| Depression Levels | *n* | % |
|---|---|---|
| None to minimal (0-9) | 232 | 67.2 |
| Mild to moderate (10-18) | 91 | 24.6 |
| Moderate to Severe (19-29) | 40 | 10.8 |
| Severe (30-63) | 7 | 1.9 |

*Note:* Depression levels measured with Beck Depression Inventory. *N* = 370

**Mediation analyses.**

Individual mediation analyses were run for each proposed mediator variable (see Tables, S1, S2, and S3 in the Supplemental Section). Results indicated a mediation effect for anxiety and past negative time perspective but not dissociation. A parallel mediation model was designed with anxiety, past negative time perspective, and dissociation as parallel mediators between trauma and depressive symptoms (Figure 1). The direction and significance of the mediators for

the parallel mediation were similar to the single-mediator analyses (see Table S4 in the Supplemental Section).

Individuals with increased exposure to trauma were more likely to experience increased anxiety ($b$ = .973, $p$ < .001) and increased past negative time perspective ($b$ = .088, $p$ < .001) but dissociation was not related to trauma ($b$ =2.309, $p$ = .056). Anxiety was linked with increased depressive symptoms ($b$ = .614, $p$ < .001). Past negative time perspective was also linked with increased depressive symptoms ($b$ = 2.705, $p$ < .001). Dissociation was not related to depressive symptoms ($b$ = .008, $p$ = .276). Anxiety accounted for 84.05% of the total effect while past negative time perspective accounted for 33.44%. When all three mediators were included in the mediation model, the direct effect of trauma on depressive symptoms became non-significant [95% CI: -.4491, .1645]. Because the direct effect was reduced to below zero, the percentage of the total effect that was mediated was 100%.

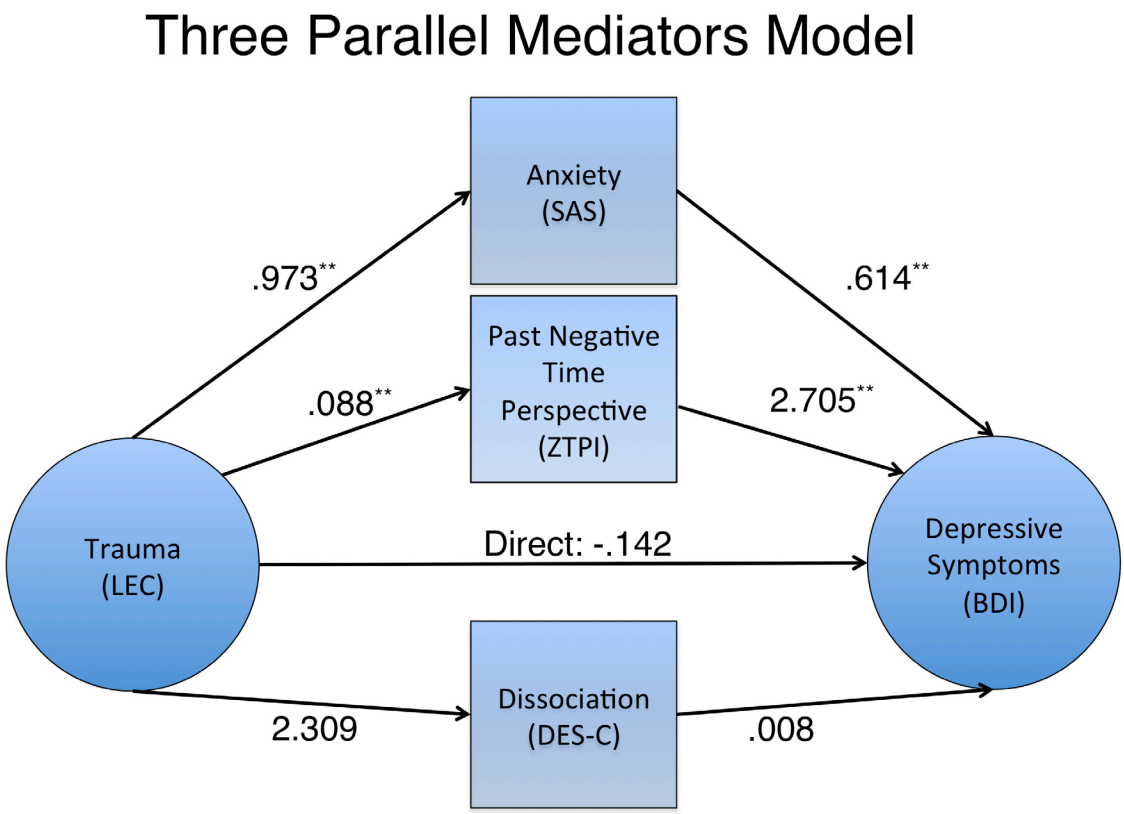


*Figure 1.* Parallel mediation model with anxiety, past negative time perspective, and dissociation as mediators between trauma and depressive symptoms.

## Discussion

Our results indicate that trauma is associated with depressive symptoms such that individuals who have been exposed to a greater number of potentially traumatic events are also more likely to report higher depressive symptoms scores. However, although our results were statistically significant, it was a small effect size ($r$ = .16). This may suggest that trauma exposure is not the only or even the major cause of depressive symptoms. Nevertheless, for individuals who are traumatized and then develop depressive symptoms, or for those clinicians who treat such patients, this is still an important association to explain. Our study contributes to

current literature by showing that past negative time perspective and anxiety fully mediated the relationship between exposure to trauma and depressive symptoms. Anxiety accounted for more of the variance than past negative time perspective. Interestingly, dissociation was not a mediator.

To our knowledge, our study is the first to show the full mediation effect of past negative time perspective on the relationship between trauma and depressive symptoms. However, these results do mirror Holman and Silver's (1998) findings, only using slightly different constructs. Our trauma is somewhat related to their "temporal disintegration" that is experienced during traumatic periods; our ZTPI past negative time perspective is similar to their "past temporal orientation"; and our depressive symptoms measure is somewhat similar to their "emotional distress" (Holman and Silver, 1998, p. 1155). Here, we take the analysis a step further and show that anxiety is also a mediator. This suggests that both cognitive (time perspective) and affective (anxiety) factors mediate the relationship between trauma and depressive symptoms. To illustrate possible pathways, a speculative theoretical model of these relationships is shown in Figure 2.

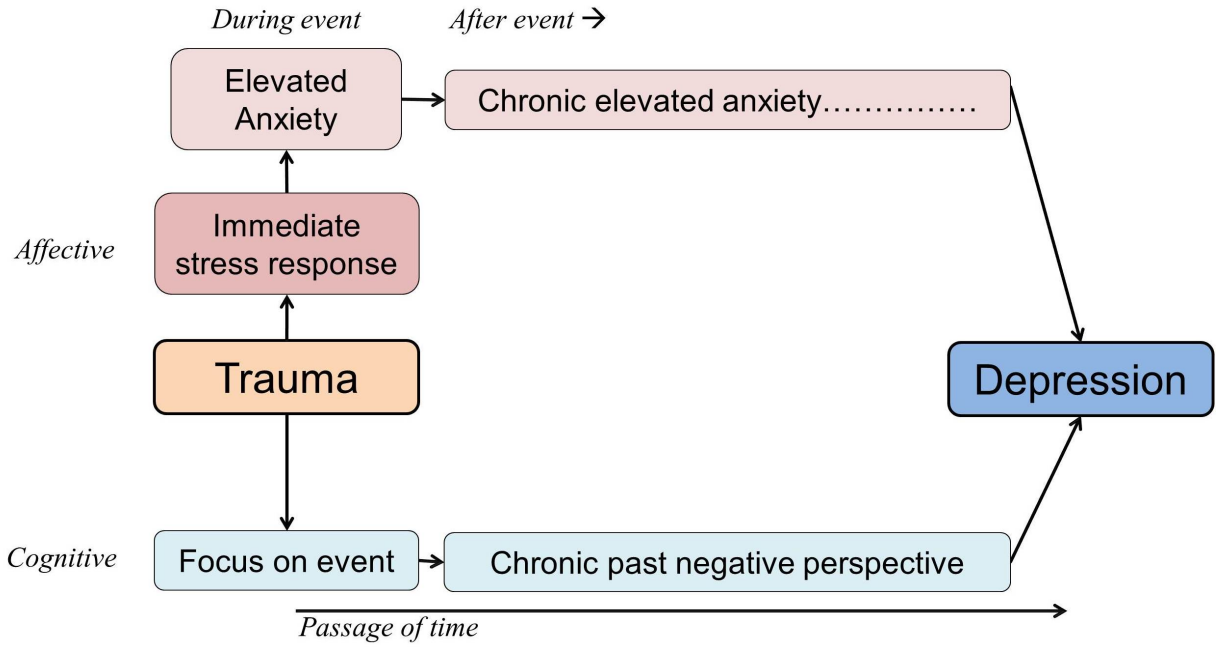


*Figure 2.* Speculative pathways by which anxiety and past negative time perspective could act as mediators of the relationship between trauma exposure and depressive symptoms.

It should be noted that it is unclear whether anxiety is a full mediator because it is part of a mediating causal pathway or merely due to the fact that anxiety and depressive symptoms are overlapping constructs (and often comorbid) and therefore have a good deal of shared variance. If this is the case our analysis can be viewed as controlling for anxiety, thus controlling for affective effects of trauma, suggesting that the cognitive aspects of a past negative time perspective mediate trauma and depressive symptoms. Nevertheless, it is possible that the mediation by anxiety is due to a theoretical pathway whereby trauma activates a stress response involving elevated anxiety and a prolonged state of anxiousness eventually wears down the system, and partly contributes to the development of depressive symptoms (see Figure 2, top; cf. Lesse, 1982).

With regard to the full mediation of past negative time perspective, a speculative theoretical pathway could be that exposure to trauma leads the person to focus a lot of attention

on the traumatic event in the *present*, and as time passes the event moves from the present to the past. The individual continues to remain focused on the traumatic event as time passes. It may be this prolonged and persistent focus on past negative events that in part contributes to the development of depressive symptoms (see Figure 2, bottom). This is consistent with Holman and Silver's (1998; Study 3) findings from their longitudinal study with community samples. They found that temporal disintegration at the time of the trauma (which was related to trauma severity) predicted later emotional distress, but this relationship was mediated by a past-oriented time perspective.

Our finding that past negative time perspective is a mediator of the relationship between trauma and depressive symptoms has some overlap with previous research on rumination and depressive symptoms. Rumination involves negative thoughts about the self in the *present,* as well as specific events of the past (Nolen-Hoeksema, Blair, Wiscol, & Lyubomirsky, 2008). While rumination involves specific events that individuals compulsively think about, past negative time perspective reflects a more general bias in which individuals tend to reinterpret ambiguous, neutral, or even positive events in the past as negative (Zimbardo & Boyd, 1999). Because these constructs are not identical, our results prompt future research that could investigate whether rumination is, like past negative time perspective, also a mediator in the relationship between trauma and depressive symptoms.

Similarly, there is a question as to whether past negative time perspective might overlap with PTSD symptoms. This is true in that both share a negative view of the past. However, past negative time perspective does not measure many aspects of PTSD, such as anxiety, memory flashbacks, and current feelings of anger. Future research could investigate the interplay and overlap of PTSD, anxiety, and past negative time perspective.

We found that dissociation was not a mediating factor of the relationship between trauma and depressive symptoms. Past research findings on dissociation in relation to trauma have been inconsistent. Dissociation has been argued to be a defense mechanism for individuals who have experienced trauma. This has been suggested in previous articles that contend that trauma leads to dissociation (e.g., Dalenberg et al., 2012). However, others suggest people who are more likely to dissociate may also be more prone to interpret events as traumatic (e.g., Rassin & van Rootslaar, 2006). In our sample, the results do not support the idea that trauma leads to dissociation, which in turn leads to depressive symptoms. The mediators, anxiety and past negative time perspective, explain the relationship between trauma and depressive symptoms better than did dissociation.

One limitation of this study is that we used a cross-sectional research design that makes it difficult to establish the temporal sequence of events from trauma through the mediators and then to depressive symptoms. Although it appears logical that exposure to trauma occurred temporally before the subsequent depressive symptoms, it could be the case that depressed participants were more apt to exaggerate past exposure to trauma. In a cross-sectional study, statistical mediation may not mean proper mediation, i.e. that the mediators are temporally ordered causal agents from the IV to the DV. Nevertheless, Holman and Silver's (1998; Study 3) use of a longitudinal design was able to establish this temporal order from trauma, through to the later development of a past-oriented time perspective, and finally to distress. Other third variables in the relationship between trauma and depressive symptoms are possible too, although it should be noted that past negative time perspective and anxiety already explained virtually all (100% of the variance statistically) of the relationship. A potential criticism might be that the relationship between trauma and depressive symptoms was so weak that anything might mediate it. However, this is

likely not warranted because even dissociation, which is a theoretically relevant possible mediator, did not actually mediate the relationship (nor did the other time perspective subscales apart from past-negative). Nevertheless, there may be other potential mediators (e.g., stress, cognitive functioning) that were not assessed. It may also be that the dissociation scale used in this study overlaps with mental health symptoms and thus masks the unique effect of dissociation on the relationship between trauma and depressive symptoms. Additionally, our sample included female undergraduates and there is some uncertainty whether these results would generalize to men, individuals in other cultures, age groups, or socioeconomic-status. Our non-random sample is also a limitation because the participants who volunteered may be different than those that did not. In addition, care should be taken in generalizing student samples to other populations before first replicating these patterns in community and clinical samples. Nevertheless, our findings support those of Holman and Silver (1998) and Lesse (1982) who found conceptually similar results in community and clinical populations.

Another limitation is that the LEC does not give a nuanced indication of the intensity or frequency within a given subcategory of trauma. For example, a participant indicating that a physical assault happened to them may have experienced far less trauma if it happened once with low intensity compared to someone seriously physically assaulted many times. Future research could measure the quantity and intensity within subcategories of trauma to test our model and add additional insights.

The findings of this study can be used to generate hypotheses for further research. For example, research could test our theoretical model or aim at improving existing therapeutic interventions for traumatized individuals who are suffering from subsequent depressive symptoms. Given that past negative time perspective was a mediator of the relationship between

trauma and depressive symptoms, research could investigate whether targeting a client's past negative focus would help someone who has trauma-induced depressive symptoms. There is a new treatment currently being developed called time perspective therapy (TPT) that aims to reorient an individual's time perspective (Sword, Sword, Brunskill, & Zimbardo, 2014). This therapy attempts to create a balance of an individual's time perspectives; our study generates the hypothesis that focusing in on reducing past negative may be the most effective strategy for depressive symptoms. However, there is no empirical data neither confirming that hypothesis, nor the effectiveness of TPT. It remains to be seen whether TPT can effectively help. It is important that efficacy is established first in clinical trials, because as noted, we have established correlation, and a theoretically logical temporal order, but still not causal relationship. The current study may in part explain why cognitive-behavioral therapy (CBT) has been successful in treating depressed people who have been traumatized (Beltman, Oude Voshaar, & Speckens, 2010). While CBT does not directly attempt to reduce an individual's past negative time perspective, it may indirectly lessen it by trying to change a client's appraisals and orienting them to focus on present solutions. The mediation of anxiety produces the hypothesis that TPT, CBT, and other treatments might also aim at reducing chronic anxiety, although such an approach would require further validation. Additionally, further research could measure both state and trait anxiety to address the potential alternative pathway whereby trait anxiety prior to trauma could lead to elevated rates of mental health problems following trauma.

The relationship between exposure to trauma and subsequent depressive symptoms may be a small association, but it is a very important one. Some people who are traumatized ultimately develop depressive symptoms, and that can lead to great distress and other associated problems. Explaining that relationship could offer important insight for clinicians, researchers,

and clients. In our sample of female undergraduates, our mediators explained all of the variance in that relationship. A focus on past negative events fully mediated the relationship between trauma and depressive symptoms. Anxiety was a statistical mediator too with an even larger effect.

**Open Data and Materials**

The dataset and materials for the main analysis are permanently and publicly posted on the Open Science Framework: https://osf.io/rj3fa

**Declaration of Conflicting Interests**

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

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**SUPPLEMENTAL MATERIAL**

## Individual Mediation Analyses for Proposed Mediating Variables

Table S1.
*Full Mediation of Anxiety in a Single Mediator Model*

| | Unstandardized Coefficients | | *t* | *p* | 95% CI for *b* | |
|---|---|---|---|---|---|---|
| | *b* | Std. Error | | | Lower Bound | Upper Bound |
| Trauma | .973 | .227 | 4.297 | < .001 | .528 | 1.419 |

*Notes.* Dependent Variable: Anxiety = SAS. *N* = 370.

| | Unstandardized Coefficients | | *t* | *p* | 95% CI for *b* | |
|---|---|---|---|---|---|---|
| | *b* | Std. Error | | | Lower Bound | Upper Bound |
| Trauma | .001 | .161 | .006 | .995 | -.315 | .317 |
| Anxiety | .729 | .036 | 20.190 | < .001 | .658 | .800 |

*Notes.* Dependent Variable: Depression = BDI Total. *N* = 370.

Table S2.
*Full Mediation of Past Negative Time Perspective in a Single Mediator Model*

| | Unstandardized Coefficients | | *t* | *p* | 95% CI for *b* | |
|---|---|---|---|---|---|---|
| | *b* | Std. Error | | | Lower Bound | Upper Bound |
| Trauma | .088 | .018 | 4.830 | < .001 | .052 | .124 |

*Notes.* Dependent Variable: Past Negative Time Perspective = ZTPI Total. *N* = 370.

| | Unstandardized Coefficients | | *t* | *p* | 95% CI for *b* | |
|---|---|---|---|---|---|---|
| | *b* | Std. Error | | | Lower Bound | Upper Bound |
| Trauma | .146 | .202 | .722 | .471 | -.251 | .542 |
| Past Negative | 6.431 | .561 | 11.471 | < .001 | 5.328 | 7.533 |

*Notes.* Dependent Variable: Depression = BDI Total. *N* = 370.

Table S3.

*Trauma and Depression Relationship Still Significant when Controlling for Dissociation.*

| | Unstandardized Coefficients | | *t* | *p* | 95% CI for *b* | |
|---|---|---|---|---|---|---|
| | *b* | Std. Error | | | Lower Bound | Upper Bound |
| Trauma | 2.309 | 1.203 | 1.920 | .056 | -.056 | 4.674 |

*Notes.* Dependent Variable: Dissociation = DES-C Total. $N = 370$.

| | Unstandardized Coefficients | | *t* | *p* | 95% CI for *b* | |
|---|---|---|---|---|---|---|
| | *b* | Std. Error | | | Lower Bound | Upper Bound |
| Trauma | .563 | .216 | 2.610 | .009 | .139 | .987 |
| Dissociation | .064 | .009 | 6.889 | < .001 | .046 | .082 |

*Notes.* Dependent Variable: Depression = BDI Total. $N = 370$.

**Parallel Mediators Analysis**

Table S4.

*Anxiety, Past Negative Time Perspective, and Dissociation in a Parallel Mediation Model.*

| | Unstandardized Coefficients | | *t* | *p* | 95% CI for *b* | |
|---|---|---|---|---|---|---|
| | *b* | Std. Error | | | Lower Bound | Upper Bound |
| Trauma | .973 | .227 | 4.297 | < .001 | .528 | 1.419 |

*Notes.* Dependent Variable: Anxiety = SAS. *N* = 370.

| | Unstandardized Coefficients | | *t* | *p* | 95% CI for *b* | |
|---|---|---|---|---|---|---|
| | *b* | Std. Error | | | Lower Bound | Upper Bound |
| Trauma | .088 | .018 | 4.830 | < .001 | .052 | .124 |

*Notes.* Dependent Variable: Past Negative Time Perspective = ZPTI. *N* = 370.

| | Unstandardized Coefficients | | *t* | *p* | 95% CI for *b* | |
|---|---|---|---|---|---|---|
| | *b* | Std. Error | | | Lower Bound | Upper Bound |
| Trauma | 2.309 | 1.203 | 1.920 | .056 | -.056 | 4.674 |

*Notes.* Dependent Variable: Dissociation = DES-C. *N* = 370.

| | Unstandardized Coefficients | | *t* | *p* | 95% CI for *b* | |
|---|---|---|---|---|---|---|
| | *b* | Std. Error | | | Lower Bound | Upper Bound |
| Trauma | -.142 | .156 | -.912 | .362 | -.449 | .165 |
| Anxiety | .614 | .040 | 15.304 | < .001 | .535 | .692 |
| Past Negative TP | 2.705 | .500 | 5.408 | < .001 | 1.721 | 3.688 |
| Dissociation | .008 | .007 | 1.090 | .276 | -.006 | .022 |

*Notes.* Dependent Variable: Depression = BDI Total. *N* = 370.

**PROCESS Syntax**

*Parallel Mediator Model with Anxiety, Past Negative Time Perspective, and Dissociation*

```
process vars = lec_ttl bdi_total SAS_ttl_w_reversecoded5.9.13.17.19 desc_total tp_pn / y=
bdi_total / x= lec_ttl / m = SAS_ttl_w_reversecoded5.9.13.17.19 desc_total tp_pn
      /  model=4/ plot=1 /CONF = 95 / boot = 10000 / effsize = 1
```

*Individual Mediator Model with Anxiety Only*

```
process vars = lec_ttl bdi_total SAS_ttl_w_reversecoded5.9.13.17.19/ y= bdi_total / x= lec_ttl /
m = SAS_ttl_w_reversecoded5.9.13.17.19
      /  model=4/ plot=1 /CONF = 95 / boot = 10000 / effsize = 1
```

*Individual Mediator Model with Past Negative Time Perspective Only*

```
process vars = lec_ttl bdi_total tp_pn / y= bdi_total / x= lec_ttl / m = tp_pn
      /  model=4/ plot=1 /CONF = 95 / boot = 10000 / effsize = 1
```

*Individual Mediator Model with Dissociation Only*

```
process vars = lec_ttl bdi_total desc_total / y= bdi_total / x= lec_ttl / m = desc_total
      /  model=4/ plot=1 /CONF = 95 / boot = 10000 / effsize = 1
```